Youth & Family Fitness Issues & Trends

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American Council on Exercise

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OUTLINE

- Youth Fitness Training
- Metabolic Syndrome
- Government Exercise Guidelines
- AEDs in the Fitness Environments

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OUTLINE (cont.)

- The Validity of the Fat-burning Zone
- Best Calorie-burning Exercise Machines
- Physiological Effects of Yoga & Pilates
- Identifying the Best Ab Exercise

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Major Concerns Regarding Strength Training and Kids

- **Does strength training place undue stress on the developing musculoskeletal systems of youngsters?**
- **Does strength training provide any demonstrable benefits for young participants?**

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Areas of High Vulnerability

- Growth cartilage
- Lumbar spine

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Primary Sites for Growth Cartilage

- Epiphyseal plates
- Apophyseal insertions
- Articular cartilage

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Acute Trauma vs. Repeated Episodes of Microtrauma

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Key Point #1

The most commonly reported growth cartilage injuries have been to the wrist joint during heavy overhead lifts.

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Key Point #2

Growth cartilage injuries resulting from a properly designed and supervised strength training program are rare.

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Risk-Benefit Analysis of Youth Strength Training Programs

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Basic Youth Strength Training Guidelines

- No absolute age cut-off exists that should preclude youngsters from strength training.
  - Be mature enough to accept instruction
  - Desire to participate
  - Possess proficiency in the basic motor skills
  - Adhere to proper form while lifting
  - Avoid competitive lifting
  - Be closely supervised

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General Training Principles

- Begin and end each session with 5-10 minutes of warm-up.
- Balance the workout by alternating "pairs of muscle groups.
- Exercise the larger muscle groups first and the smaller muscle groups at the end.
- Lift and lower weights in a controlled fashion.
- Complete the full range of motion for each exercise.
- Allow 48 hours of recovery after each strength training session.

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Basic Strength Training R_x for Pre-pubertal Children

Frequency:	**2-3 times per week**
Duration:	**20 -30 minutes per session**
Intensity:	**•Begin with minimal resistance until proper form is developed.**
	•Start with 1 set of 13-15 reps (upper body) and 13-20 reps (lower body).
Type:	**•Avoid maximal lifts.**
	8-10 different multi-joint exercises, ensuring that all the major muscle groups are included.
Progression:	**Add 1-3 lbs. if the top of the rep**

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Basic Strength Training R_x for Post-pubertal Youth

Frequency:	**2-3 times per week**
Duration:	**30 - 45 minutes per session**
Intensity:	**•Begin with minimal resistance until proper form is developed.** **•Start with 1 set of 8-12 reps (upper body) and 8-15 reps (lower body).**
Type:	**•Avoid maximal lifts.** **10-12 different multi-joint exercises, ensuring that all the major muscle groups are included.**
Progression:	**Add 2-5 lbs. if the top of the rep**

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Similarities and Differences in the Exercise Responses of Youngsters and Adults for the Respiratory System

YOUNGSTERS			
MEASURES	<Adults	=Adults	>Adults
Minute Ventilation		X (per kg of BW @ max exercise)	X (per kg of BW during Sub-max exercise)
Tidal Volume	X		
Breathing frequency			X
Oxygen Saturation		X	
Arteriovenous difference		X (max exercise)	X (sub-max exercise)

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Similarities and Differences in the Exercise Responses of Youngsters and Adults for the Cardiovascular System

YOUNGSTERS			
MEASURES	<Adults	=Adults	>Adults
Cardiac Output	X		
Stroke Volume	X		
Heart Rate			X (sub-max and max exercise)
Muscle blood flow			X
Max Oxygen Uptake		X	

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Similarities and Differences in the Exercise Responses of Youngsters and Adults for the Thermoregulatory System

YOUNGSTERS			
MEASURES	<Adults	=Adults	>Adults
Convective heat exchange			X
Radiant heat exchange			X
Sweat gland number		X	
Temp. of sweat gland activation			X
Sweat production per gland	X		
Sweat rate per unit of SA	X		

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HYDRATION TIPS FOR ACTIVE KIDS

- **Encourage drinking on a set schedule.**
- **Offer the "right" kinds of fluids.**
- **Adjust hydration habits for the weather.**
- **Recognize the warning signs of dehydration.**

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NATA & AAP GUIDELINES FOR DRINKING

WHEN	KIDS < 90 lbs.	KIDS > 90 lbs.
1 hr. before activity	3-6 oz. of fluid	6-12 oz. of fluid
During activity	3-5 oz. of fluid	6-9 oz. of fluid every 20 mins.
After activity, fluid, replace fluids lost	Up to 8 oz. of fluid, per ½ lb. lost	Up to 12 oz. of per ½ lb. lost through sweat

Never drink too much or attempt to gain weight by drinking excessive fluid. Overdrinking can cause hyponatremia, a rare medical condition that occurs when a person drinks excessively.

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HYDRATION TIPS FOR ACTIVE KIDS

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THE RIGHT KINDS OF FLUIDS

- When given a choice kids have been shown to drink 90% more sports drink than plain water.
- Sports drinks:
  - Help replace electrolytes lost through sweat.
  - Contain flavor to encourage drinking.
  - Provide energy to refuel during activity.

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HYDRATION TIPS FOR ACTIVE KIDS

- Encourage drinking on a set schedule.
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ACTIVITY GUIDELINES FOR PREVENTING DEHYDRATION IN ACTIVE KIDS

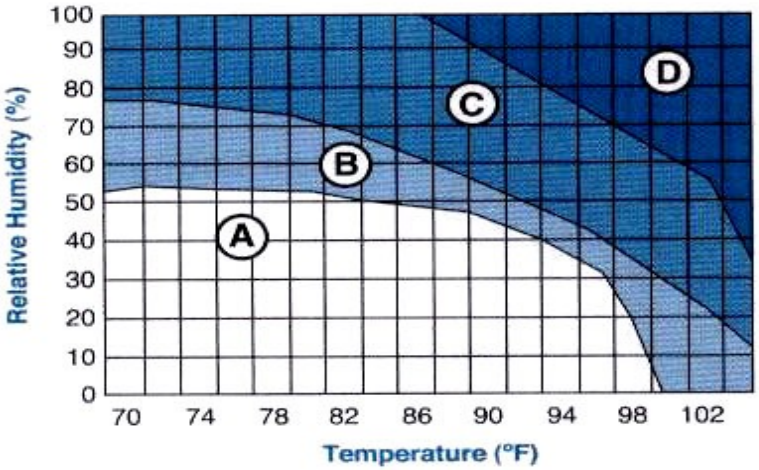
Activity Guidelines

Fluid breaks should be scheduled for all practices and become more frequent as the heat and humidity levels rise.

Add 5°F to the temperature between 10:00 a.m. and 4:00 p.m. from mid-May to mid-September on bright, sunny days.

A. Children should receive a 5–10 minute rest and fluid break after every 25 to 30 minutes of activity.

B. Children should receive a 5–10 minute rest and fluid break after every 20 to 25 minutes of activity. Children should be in shorts and t-shirts (with helmet and shoulder pads only, not full equipment, if worn for activity).



C. Children should receive a 5–10 minute rest and fluid break after every 15 to 20 minutes of activity. Children should be in shorts and t-shirts only (with all protective equipment removed, if worn for activity).

D. Cancel or postpone all outdoor practices/games. Practice may be held in an air-conditioned space.

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HYDRATION TIPS FOR ACTIVE KIDS

- Encourage drinking on a set schedule.
- Offer the "right" kinds of fluids.
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SIGNS OR SYMPTOMS OF EARLY HEAT ILLNESS

- Headache.
- Dizziness.
- Weakness.
- Irritability.
- Fatigue.
- Nausea.
- Muscle cramps.

(NATA 2003)

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THE CARDIOMETABOLIC DISEASE CONCEPT

Physical Inactivity
High-Fat, High-Sugar Diet
Chronic Stress
Abdominal Adiposity

↓

INSULIN / GLUCOSE-4 RECEPTOR DYSFUNCTION

↓

THE METABOLIC SYNDROME (INSULIN RESISTANCE)

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CONSEQUENCES OF INSULIN RESISTANCE

- Leads to high blood glucose levels.
- Triggers an increase in triglyceride levels.
- Increases the small-particle LDL cholesterol levels.
- Increases sympathetic nervous system activity.
- Increases response to angiotensin II.
- Reduces amounts of nitric oxide, a vasodilator produced in the vascular endothelium.
- Increases platelet adhesiveness.

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IDENTIFYING METABOLIC SYNDROME

- **HDL** number below 40 (men) or below 50 mg/dl (women).
- **Triglyceride** number over 150 mg/dl.
- **Waist size** 34.5" or greater (women) or 40" or greater (men).
- **Blood pressure** consistently 130/85 mm Hg or greater.
- **Glucose intolerance** (fasting blood glucose of 100 mg/dl or greater).

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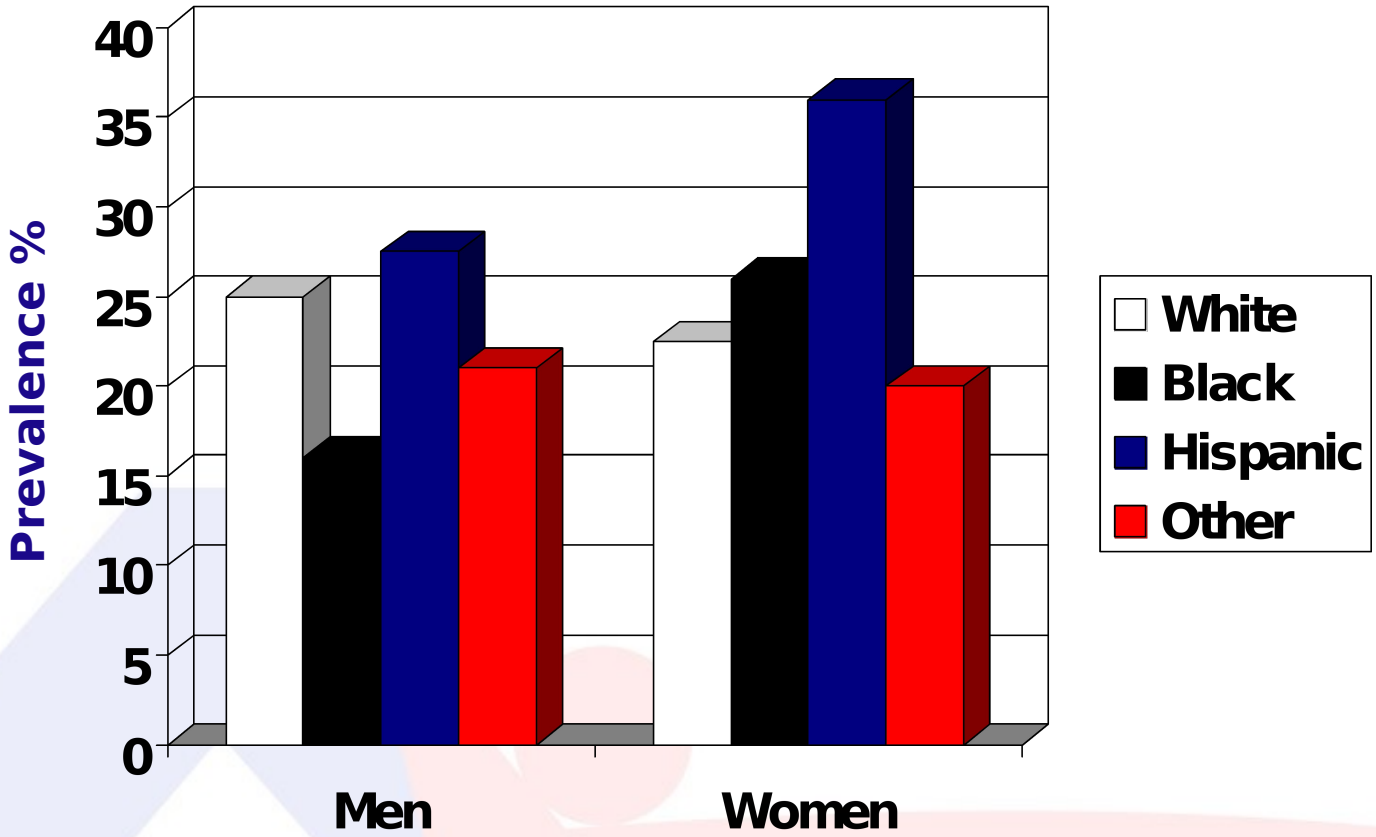
PREVALENCE OF METABOLIC SYNDROME



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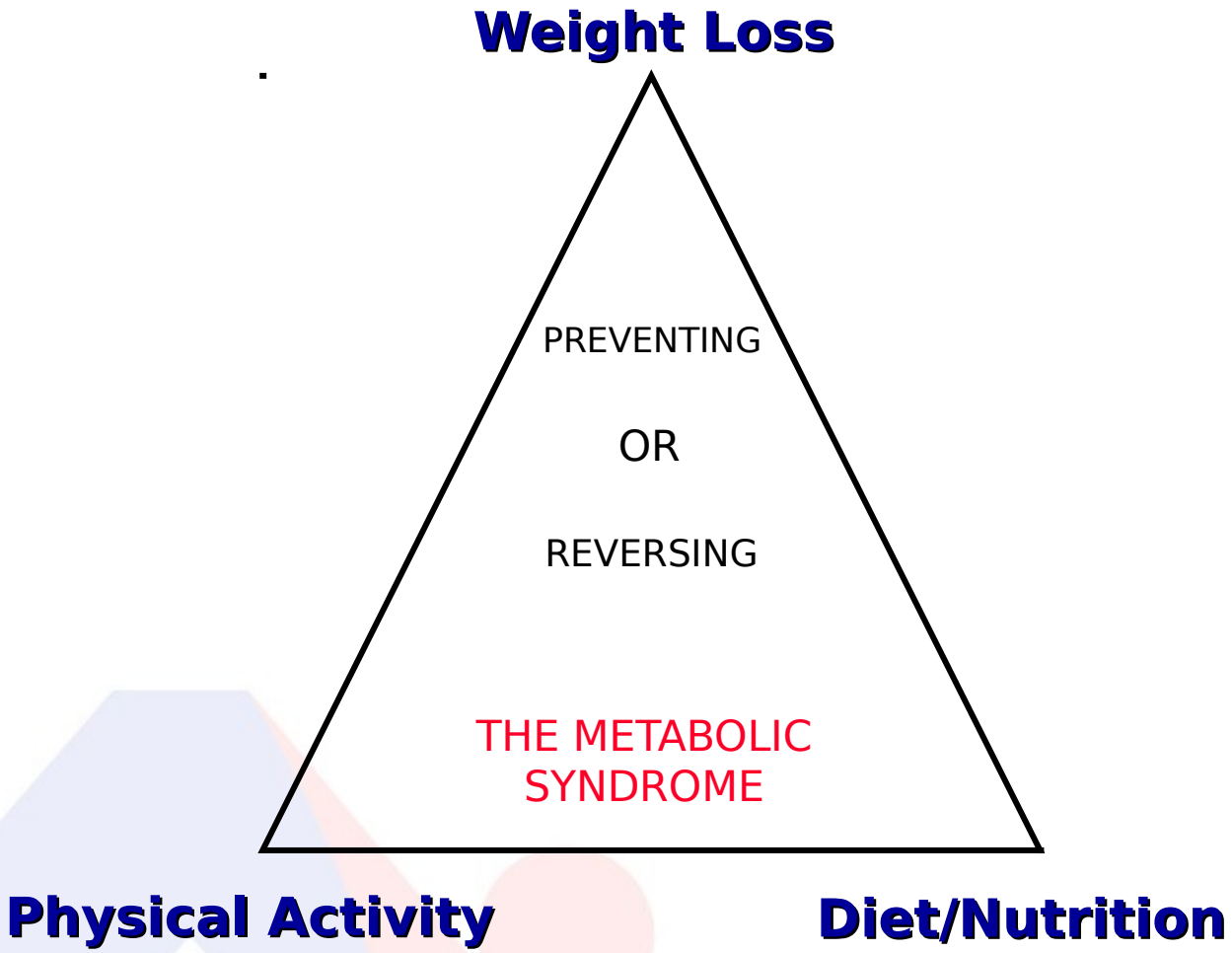

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WEIGHT LOSS & THE METABOLIC SYNDROME

- Modest (5-10% of BW) weight loss can reduce insulin resistance and BP. It can also improve blood lipid-lipoprotein profiles.
- Insulin resistance has been shown to fall approximately 20% for each 10 lbs of weight loss in overweight individuals.
- Combination of sensible nutrition and regular exercise is the most effective approach.

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DIET/NUTRITION & THE METABOLIC SYNDROME

- **Adjust the macronutrient mix.**
  - ***No more than 50% from CHO (complex not simple).***
  - ***15-20% from protein (lean or low-fat meats and dairy products).***
  - ***25-35% from fat (mono- and polyunsaturated fats, such as fish, nuts and seeds, canola, corn, olive, safflower, soybean, and sunflower oils).***
- **Increase fiber content of diet (legumes, whole grains, fruits and vegetables).**
- **Limit consumption of highly processed foods.**

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F.I.T. Rx

- **Frequency:** 5-7 days/week; preferably daily.
- **Intensity:** 40-60% of maximal capacity (i.e., 50-70% of maximum HR).
- **Time:** Time: 20-60 minutes/session; goal is to maximize calorie burn

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ACTIVITY OPTIONS

- **Low-to-moderate impact aerobic activities should be the foundation of the program.**
- **Supplemental activities may include strength training, yoga, Pilates, and other recreational activities.**
- **Statin drugs (e.g., Lipitor, Zocor, Crestor, Lescol, Pravachol) can increase the likelihood of exertional rhabdomyolysis during heavy eccentric exercise.**

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RATE OF PROGRESSION

- **Gradually move from weekly caloric expenditure totals of 300 → 600 → 900 → 1,200 → 1,500+ kcals over a 10- or 12-week period.**

- **A simple gauge to use is the total number of minutes spent exercising per week (180+ minutes per week is a good starting target).**

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HOW MUCH EXERCISE IS ENOUGH?

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1996 U.S. Surgeon General's Report

30 minutes of moderate-intensity physical activity on most days

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2002 Institute of Medicine Report

60 minutes of moderate-intensity physical activity every day

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2003 International Association for the Study of Obesity

60-90 minutes of moderate-intensity physical activity daily

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Do the three reports contradict each other?

30, 60, or 90 minutes?

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Understanding the concept of physical activity vs. exercise

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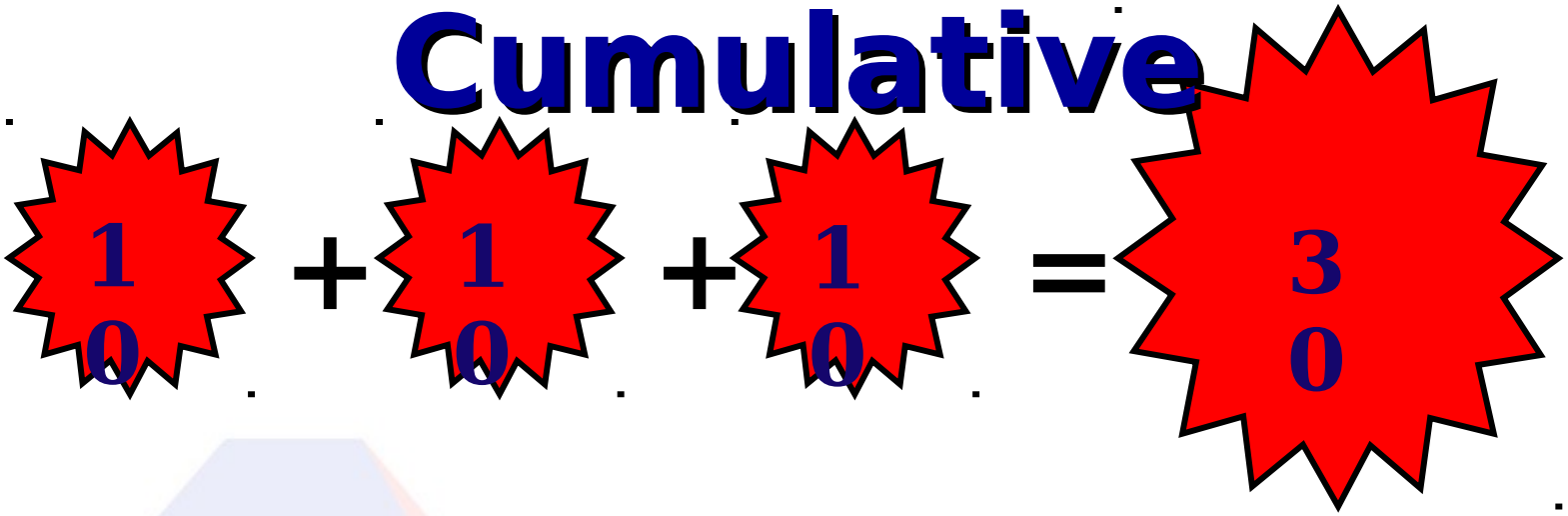
The Effects of Exercise are Cumulative



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AUTOMATED EXTERNAL DEFIBRILLATOR

- Simple device that delivers an electric shock to the heart to:
  - Stop uncoordinated rhythm.
  - Restore regular rhythm and pulse.
- If normal rhythm is not promptly restored, sudden cardiac arrest (SCA) occurs.

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EMERGENCY CARDIOVASCULAR CARE

- Each year more than 300,000 people die in the U.S. from CHD in the emergency room or before they reach the hospital.
- CPR is performed thousands of times a year with a nationwide success rate of less than 5%.
- Most of these are sudden deaths caused by cardiac arrest usually due to an abnormal heart rhythm called ventricular fibrillation.

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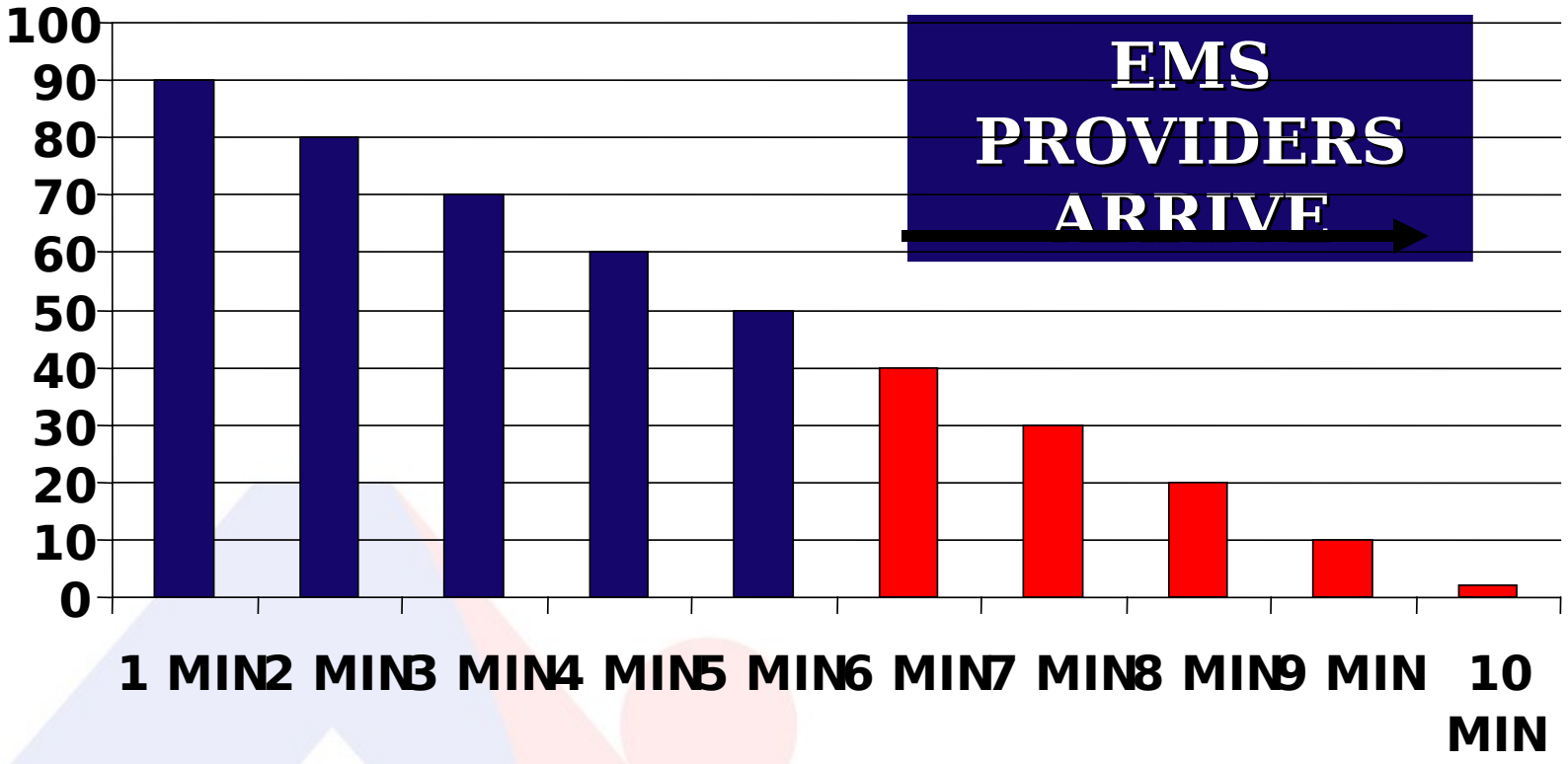
SURVIVAL FROM VF CARDIAC ARREST WITH EMS DEFIBRILLATION (6+ min)



Cummins, 1989

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HOW LIKELY IS IT THAT SOMEONE WILL SUFFER FROM A SCA IN A FITNESS ENVIRONMENT?

- Physical stress, such as exercise, can cause some individuals to develop abnormal heart rhythms which can lead to SCA.
- The largest segment of health club members is 35-54 and the "50+ crowd" represent the fastest growing segment.
- Since there is a reasonable probability for use of CPR skills and an AED device within a fitness environment, such training should be readily available for fitness professionals.

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SUCCESSFUL PUBLIC ACCESS DEFIBRILLATION PROGRAMS

- Police and EMS PAD program in Rochester, MN: 49% survival.
- Security guards in casinos in Las Vegas: 59% survival.
- PAD program at O'Hare and Midway airports in Chicago: 75% survival.

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TAKE-HOME MESSAGE

Early defibrillation can be successfully deployed by fitness professionals and plays a key role in strengthening the "chain of survival" following SCA in an exercise setting.

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Key Weight Control Benefits of Resistance Training

- Muscle more metabolically active than fat (35-50 kcal/lb/day vs. 2-3 kcal/lb/day???)
- The true metabolic rate of a pound muscle tissue is only 5-10 kcal/lb/day
- Muscle is more dense than

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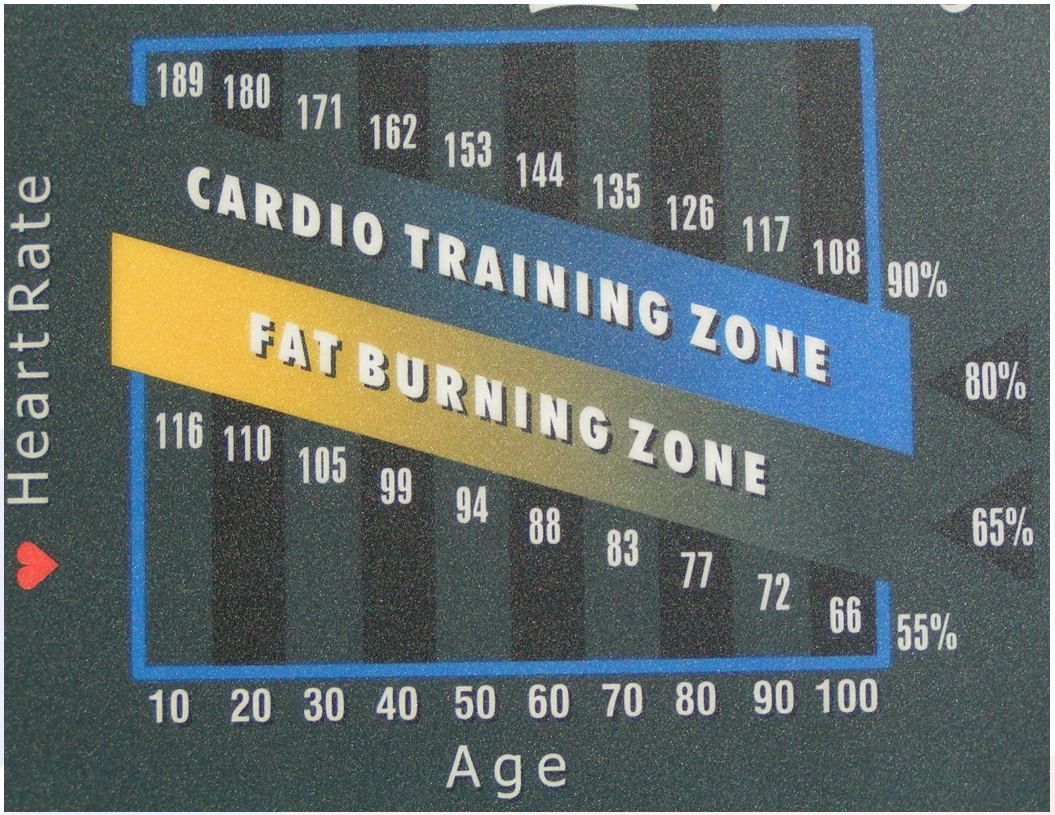
The Mythical "Fat Burning" Zone



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High Intensity vs. Low Intensity

	High-Intensity Group	Low-Intensity Group
Percent Peak $\dot{V}O_{2\ max}$	84.8*	51.1
Percent Fat Utilization	32.5	66.6*
Energy Output (kcal/session)	283.3	260.4
Workout Time (min/session)	25.0	50.0*

* p<0.01

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High Intensity vs. Low Intensity

	High-Intensity Group	Low-Intensity Group
Δ Body Weight (lbs)	-13.2	-12.3
Δ Fat Weight (lbs)	-9.9	-10.0
Δ Body Fat (%)	-3.5	-3.7

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The Valid Rationale for Low-Intensity Exercise

In terms of weight and fat loss, it's the amount of calories burned that makes the difference. Most overweight people can safely perform low-intensity exercise longer, which allows them to burn more total calories during their

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Tips for Revving Up Your Clients' Weight Loss Workouts

- Boost intensity gradually
- Vary the tempo
- Adapt the intensity to suit your clients' schedules
- Let your clients' energy levels be your guide

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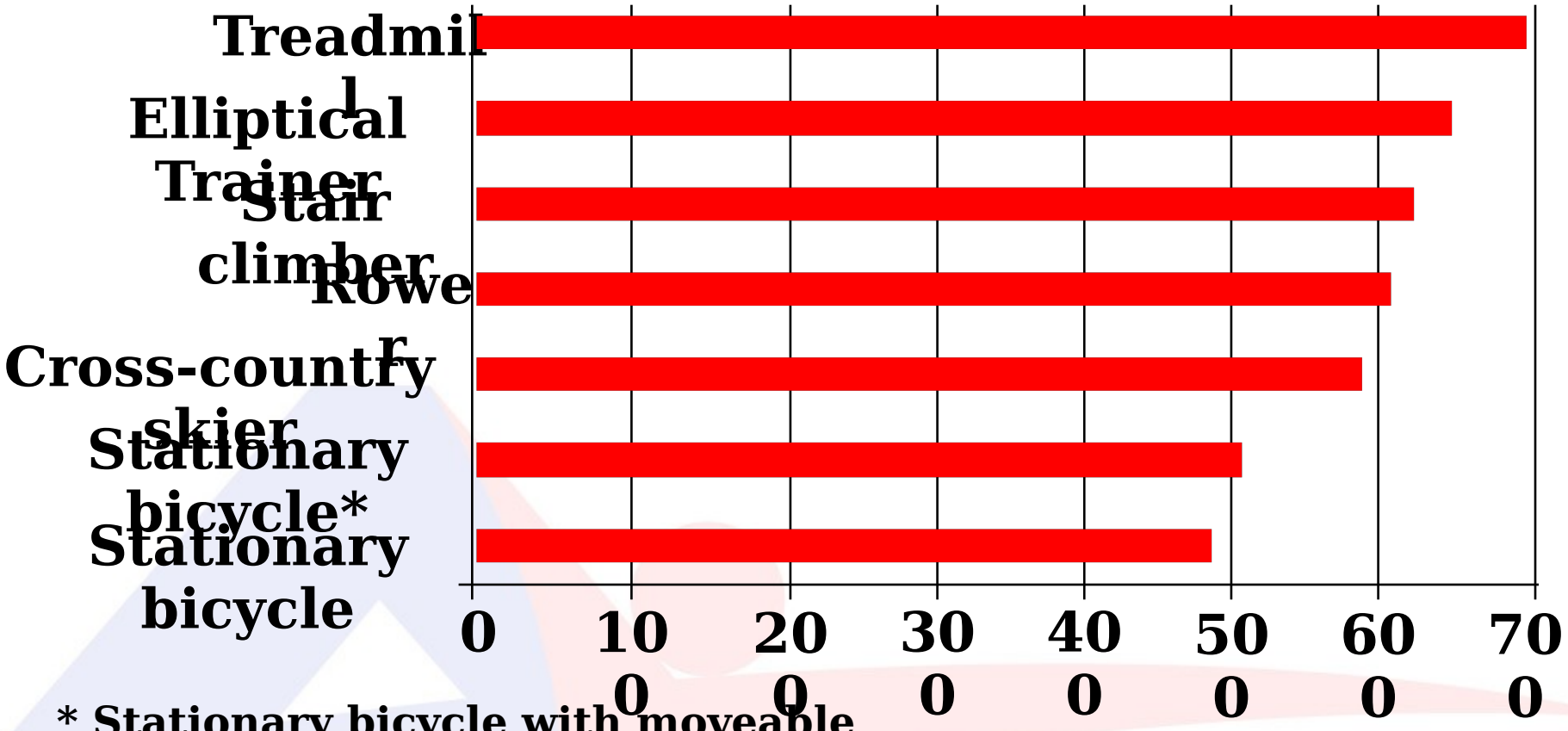
Energy Expenditure with Indoor Exercise Machines



* Stationary bicycle with moveable handlebars

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What do "high calorie-burning" machines have in common?

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Characteristics of High Calorie-Burning Exercise Machines

- Involve a large amount of muscle mass
- Weight bearing
- Easy-to-learn or natural movements

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"Keeping Things in Perspective"

- All the machines are acceptable for aerobic exercise
- The objectives of exercise include more than just burning calories
- The "*practical difference*" in caloric expenditure between the machines was small

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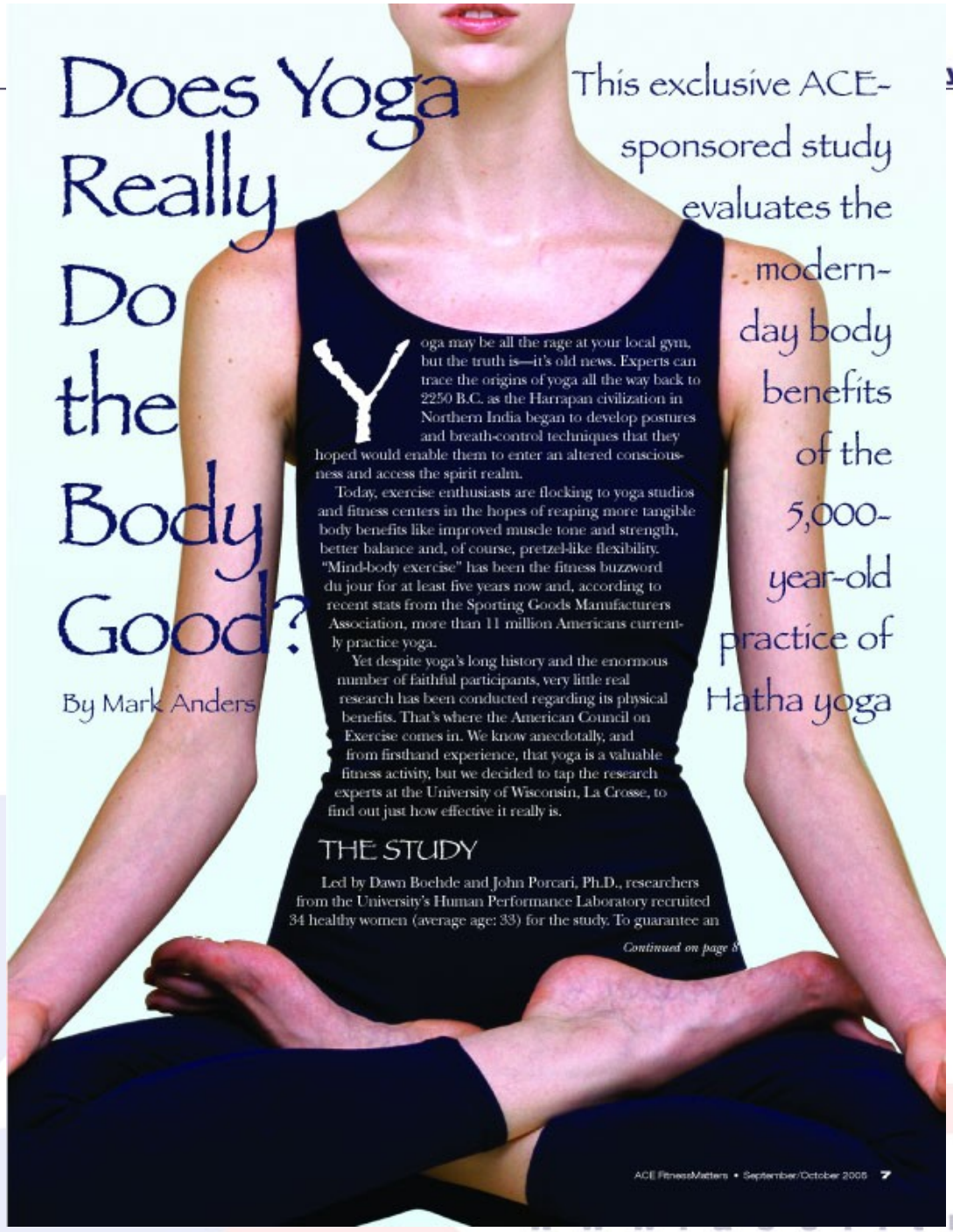

Does Yoga Really Do the Body Good?

This exclusive ACE-sponsored study evaluates the modern-day body benefits of the 5,000-year-old practice of Hatha yoga

By Mark Anders

Yoga may be all the rage at your local gym, but the truth is—it's old news. Experts can trace the origins of yoga all the way back to 2250 B.C. as the Harrapan civilization in Northern India began to develop postures and breath-control techniques that they hoped would enable them to enter an altered consciousness and access the spirit realm.

Today, exercise enthusiasts are flocking to yoga studios and fitness centers in the hopes of reaping more tangible body benefits like improved muscle tone and strength, better balance and, of course, pretzel-like flexibility. "Mind-body exercise" has been the fitness buzzword du jour for at least five years now and, according to recent stats from the Sporting Goods Manufacturers Association, more than 11 million Americans currently practice yoga.

Yet despite yoga's long history and the enormous number of faithful participants, very little real research has been conducted regarding its physical benefits. That's where the American Council on Exercise comes in. We know anecdotally, and from firsthand experience, that yoga is a valuable fitness activity, but we decided to tap the research experts at the University of Wisconsin, La Crosse, to find out just how effective it really is.

THE STUDY

Led by Dawn Boehde and John Porcari, Ph.D., researchers from the University's Human Performance Laboratory recruited 34 healthy women (average age: 33) for the study. To guarantee an

Continued on page 8

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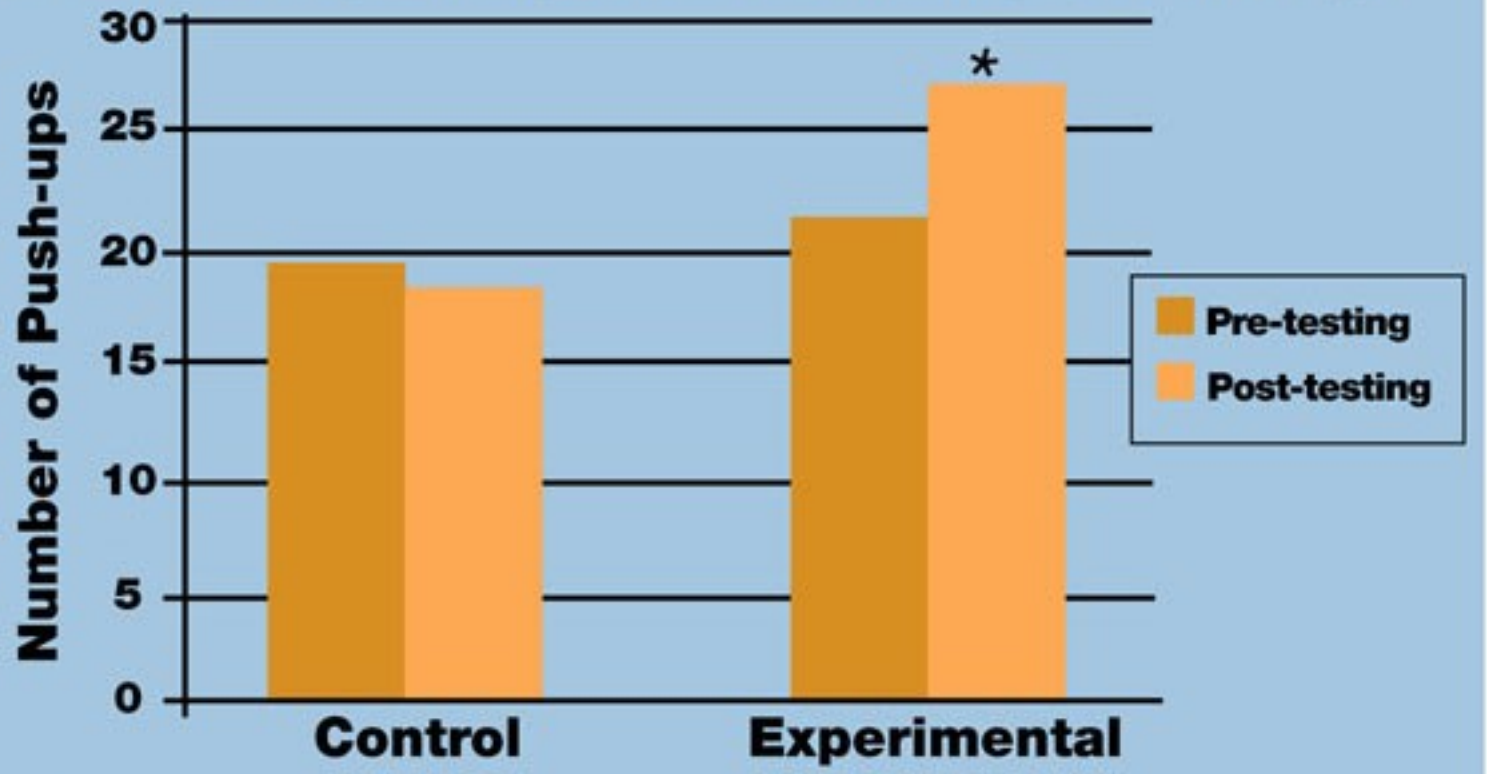
Table 1.
Changes in push-ups as a result of yoga training.



* *Significantly different from pretesting ($p < .05$)*

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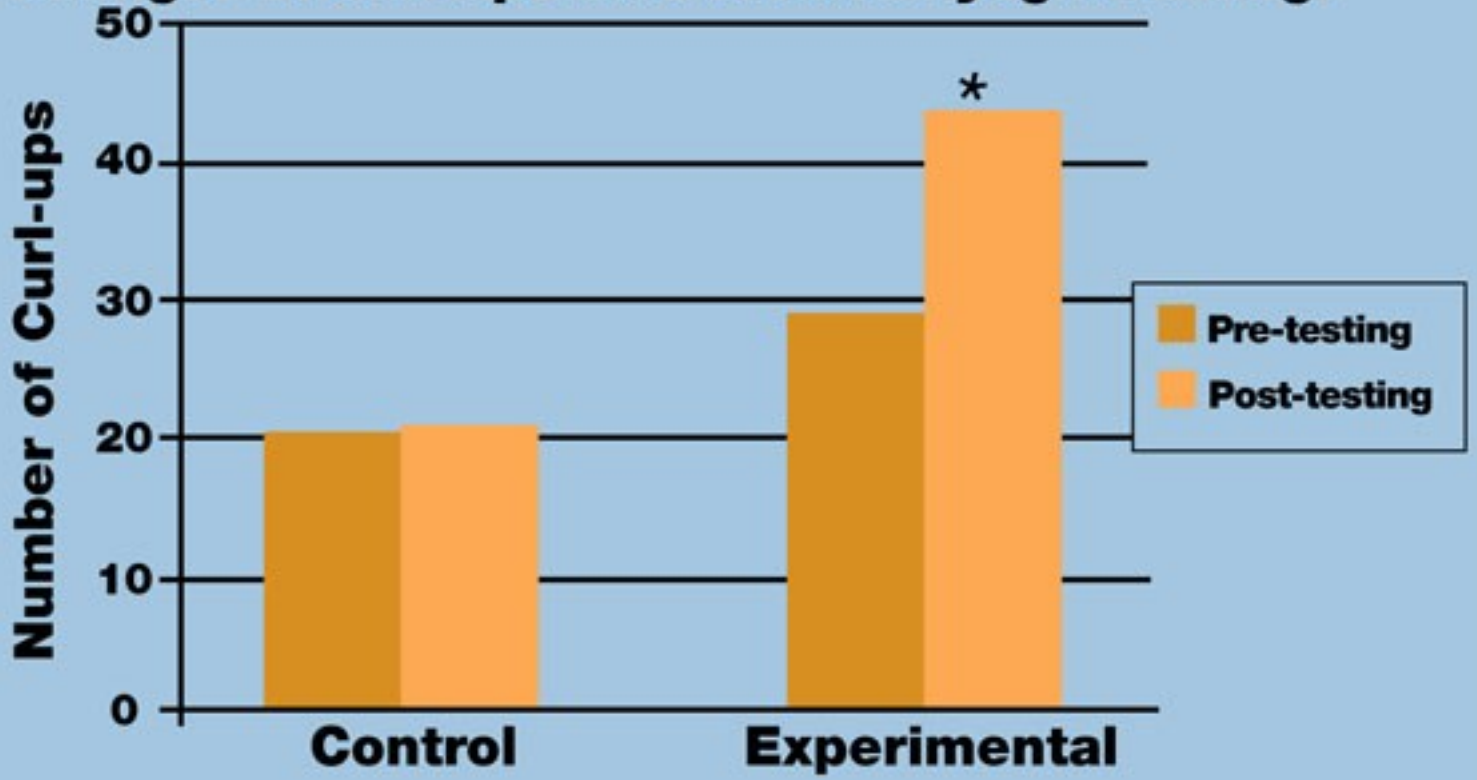
Table 2.

Changes in curl-ups as a result of yoga training.



* *Significantly different from pretesting ($p < .05$)*

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Table 3.
Changes in aerobic capacity and maximal heart rate as a result of yoga training.

Variable	Pre-testing X – SD	Post-testing X – SD
$\dot{V}O_2$ max (ml/kg/min)		
Experimental	32.8 – 7.1	35.5 – 7.2
Control	33.4 – 7.2	35.4 – 8.3
Maximal heart rate (bpm)		
Experimental	178.6 – 11.3	179.7 – 14.4
Control	182.5 – 11.9	181.3 – 12.9

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Table 4.
Average physiological responses to Hatha and Power yoga.

	Hatha Yoga	Power Yoga
HR (bpm)	89±5.8	115±8.0
% HRmax	48±3.4	62±5.4
$\dot{V}O_2$ (ml/kg/min)	9.8±1.3	18.7±1.3
% $\dot{V}O_2$ max	24±4.1	46±4.8
RPE	10.6±0.79	14.3±1.8
Kcal/min	3.1±0.78	5.9±1.0

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fitness matters
VOLUME 11 • ISSUE 6 • NOV/DEC 2005 • $5.00
American Council on Exercise
A Non-profit Organization
Can Pilates Do It All?
AN ACE-SPONSORED STUDY

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Table 2.
Average Physiological Responses to Pilates

	BEGINNER LEVEL	ADVANCED LEVEL
Warm-up		
HR (bpm)	93±3.9	105±9.3
% HR max	49±2.8	56±5.4
$\dot{V}O_2$ (ml/kg/min)	9.4±1.3	10.9±2.0
% $\dot{V}O_2$ max	23±3.7	27±4.9
RPE	8.1±1.2	10.5±2.1
Kcal/min	3.0±0.73	3.4±0.99
Workout		
HR (bpm)	102±6.0	117±7.2
% HR max	54±3.6	62±4.0
$\dot{V}O_2$ (ml/kg/min)	11.5±1.6	17.3±1.4
% $\dot{V}O_2$ max	28±4.3	43±5.3
RPE	14.2±2.3	16.5±3.5
Kcal/min	3.6±0.87	5.6±0.97
Cool-down		
HR (bpm)	92±3.7	107±6.2
% HR max	49±2.6	56.79±3.97
$\dot{V}O_2$ (ml/kg/min)	10.0±1.8	12.0±1.3
% $\dot{V}O_2$ max	25±4.9	29.5±3.1
RPE	10.7±1.6	10.2±0.84
Kcal/min	3.1±1.0	3.8±0.80

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What is the BEST Ab Exercise?

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AB EXERCISES CAN BE RANKED ACCORDING TO THE AVERAGE AMOUNT OF EMG ACTIVITY THEY GENERATE.

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BICYCLE MANEUVER

CAPTAIN' S CHAIR

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ACTIVITY IN RECTUS ABDOMINIS

RANKING	EXERCISE	MEAN % OF ACTIVITY
1	Bicycle Maneuver	248
2	Captain's Chair	212
3	Exercise Ball	139
4	Vertical Leg Crunch	129
5	Torso Track	127
6	Long Arm Crunch	119
7	Reverse Crunch	109
8	Crunch with Heel Push	107
9	Ab Roller	105
10	Hover	100
11	Traditional Crunch	100
12	Exercise Tubing Pull	92
13	Ab Rocker	21

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ACTIVITY INOBLIQUES

RANKING	EXERCISE	MEAN % OF ACTIVITY
1	Captain's Chair	310
2	Bicycle Maneuver	290
3	Reverse Crunch	240
4	Hover	230
5	Vertical Leg Crunch	216
6	Exercise Ball	147
7	Torso Track	145
8	Crunch with Heel Push	126
9	Long Arm Crunch	118
10	Ab Roller	101
11	Traditional Crunch	100
12	Exercise Tubing pull	77
13	Ab Rocker	74

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AB EXERCISES CAN ALSO BE RANKED ACCORDING TO THE LEVELS OF ABDOMINAL MUSCLE ACTIVATION AND SPINAL LOADING.

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SIT UPS: STRAIGHT LEGS VS. BENT KNEES

	Compression (N)	Shear (N)
Straight Legs	3230	260
Bent Knees	3410	300

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The Best Ab Exercise?

NO SINGLE ABDOMINAL EXERCISE EFFECTIVELY CHALLENGES ALL OF THE ABDOMINAL MUSCULATURE WHILE ALSO SPARING THE BACK.

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MODIFIED CURL-UP

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MODIFIED SIDE BRIDGE

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SIDE BRIDGE

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Thank You!

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